Uncommon Wall Thickenings in the Sieve Cells of Pteris wallichiana

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Pteris wallichiana Agardh was collected from Kerala, India, fixed in FAA, and processed for microtomy by conventional methods (Sass, 1958). Sections were stained following Cheadle, Gifford and Esau (1953). In addition, I_2KI and H_2SO_4 was used for cellulose, the PAS reaction for insoluble polysaccharides (Jensen, 1962), and Toluidine blue 'O' for cell walls (O'Brien, Feder & McCully, 1964).

During our study of phloem structure in *Pteris wallichiana* we observed uncommon papillose thickenings on the walls of sieve cells, rarely in the rhizome and frequently in the rachis. These sieve cells were randomly distributed and generally belonged to the metaphloem. Sieve cells with this thickening did not appear to be structurally different from other sieve cells. The thickenings project 2.4-10.4 μm from the sieve cell wall into the cell lumen (*Figs. 1-2*). Phloem parenchyma cells having a common wall with sieve cells rarely show this type of thickening (*Fig. 4*). The thickening may be on only one side of the common wall or it may be on both sides of the wall of two adjacent sieve cells. Occasionally small fissures, some of which may be artifacts, appear in the papillose thickenings, which cause the thickening to appear to consist of different parts (*Figs. 5-8*). The thickenings are neither tyloses nor, apparently, a reaction to fungal infection. The thickenings are PAS-positive and give a confirmatory test for cellulose. They stain purple red with toluidine blue 'O', a staining reaction similar to the remaining part of the sieve cell wall. A membraneous lining is sometimes observed over the thickenings (*Fig. 3*).

Similar wall thickenings have not been reported in sieve elements of other fern species. Warrington (1970) reported papillose cellulose thickenings of cell walls in the cortical cells of rhizome of *Geocaulon lividum* (Santalaceae), a dicotyledonous plant, but these thickenings were always in pairs on common cell walls.

LITERATURE CITED

CHEADLE, V. I., E. M. GIFFORD, Jr. and K. ESAU. 1953. A staining combination for phloem and contiguous tissues. Stain Technol. **28:** 49-53.

JENSEN, W. A. 1962. Botanical Histochemistry. W. H. Freeman, London.

O'BRIEN, T. P., N. FEDER and M. E. McCULLY. 1964. Polychromatic staining of plant cell wall by Toluidine blue 'O'. Protoplasma **59:** 367-373.

SASS, J. E. 1958. Botanical Microtechnique. Iowa State College Press, Ames.

WARRINGTON, P. D. 1970. Cell wall thickening in Geocaulon lividum (Santalaceae). Canad. J. Bot. **48:** 1677-1679.

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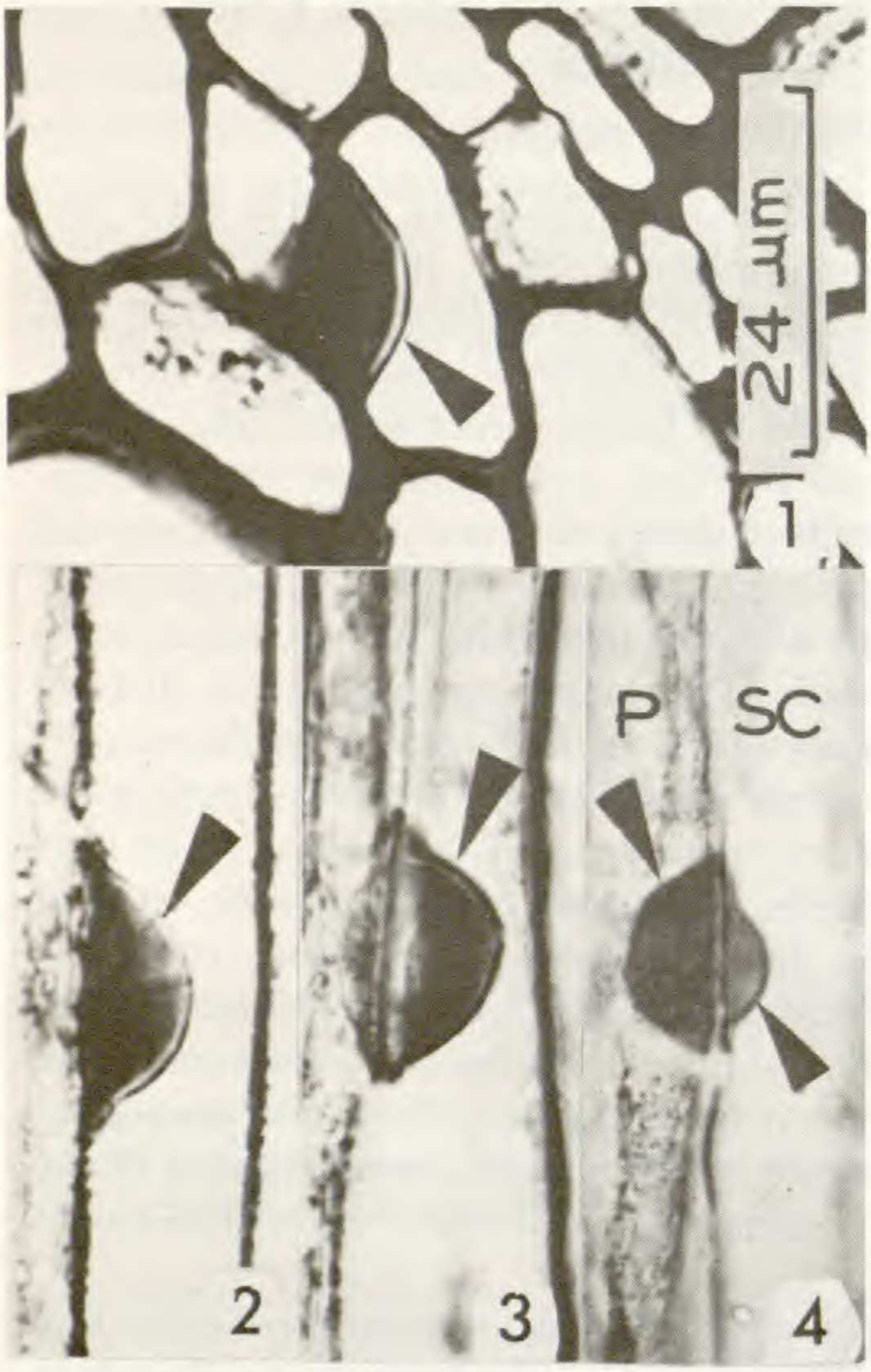

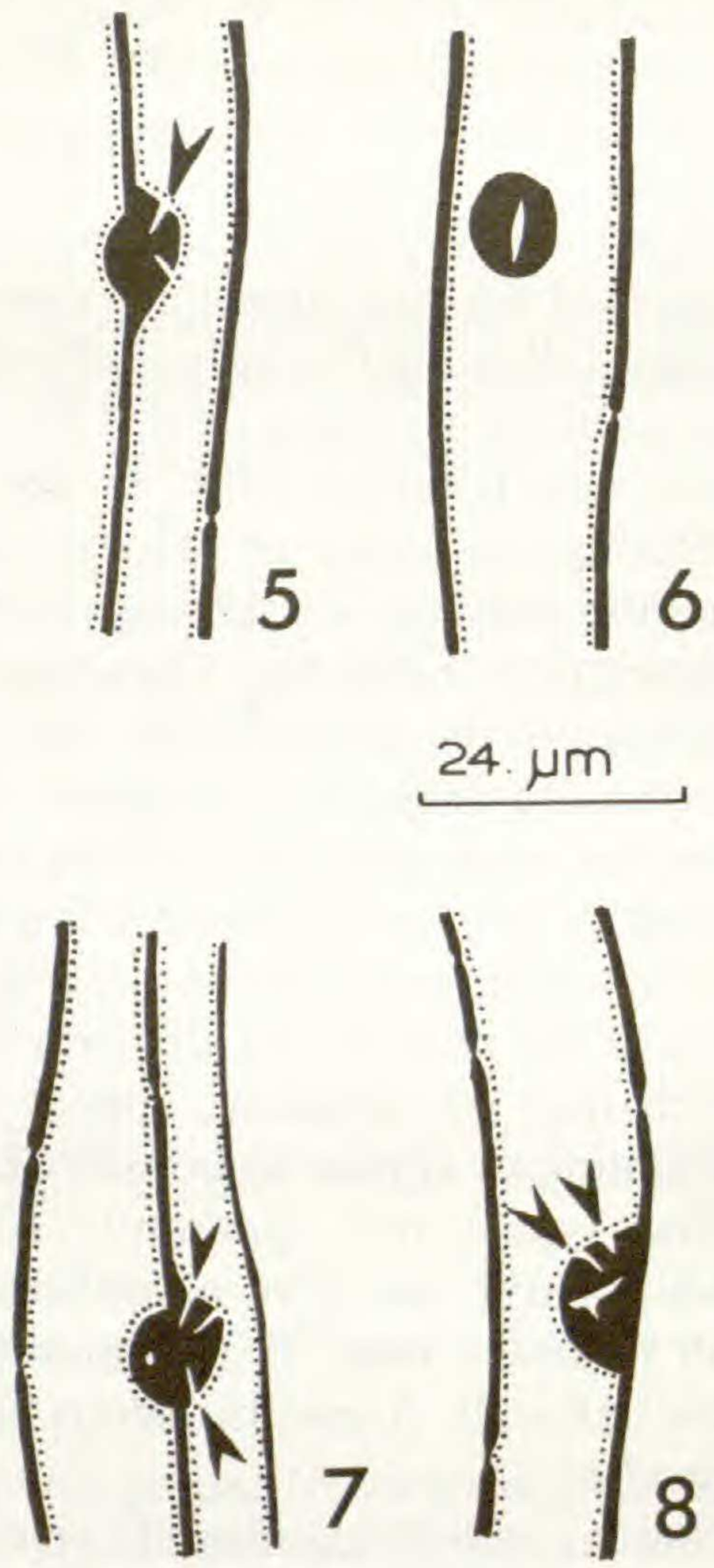

FIGS. 1-4. Rachis phloem of *Pteris wallichiana*. FIG. 1. Transection showing sieve cells with and without wall thickenings. FIG. 2. Longisection of a portion of a sieve cell showing a thickening. FIG. 3. Longisection of a portion of a sieve cell showing a thickening with membranous lining. FIG. 4. Longisection of a portion of a sieve cell and a phloem parenchyma cell showing paired thickening along the common wall. P = phloem parenchyma, SC = sieve cell. FIGS. 5-8. Longisections of portions of sieve cells showing a variety of fissures in the thickenings.